

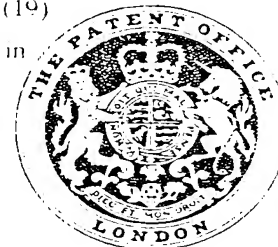
PATENT SPECIFICATION

(11)

1 538 392

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- (21) Application No. 25037/77 (22) Filed 15 Jun. 1977 (19)
 (31) Convention Application No. 7607012 (32) Filed 18 Jun. 1976 in
 (33) Sweden (SE)
 (44) Complete Specification Published 17 Jan. 1979
 (51) INT. CL.³ A23L 1/24
 (52) Index at Acceptance
 A2B 6G
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(54) LOW-CALORIE MAYONNAISE PRODUCTS, AND A METHOD OF PRODUCING THEM

(71) We, NEDRE NORRLANDS PRODUCENTFÖRENING, a Swedish incorporated association having an independent status as a legal entity, of Rådhusgatan 98, S-831 00 Östersund, Sweden, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The present invention relates to low-calorie mayonnaise products and to a method of producing them.

Mayonnaise is a water-in-oil emulsion intended, in conjunction with food preparation, as a base for sauces, decoration, salads etc. Genuine mayonnaise usually consists of oil, egg yolk, vinegar, mustard and spices. Industrially manufactured products for the consumer also contain acetic acid, sugar, salt, thickener, preservatives and dyes. Suitable thickeners for this type of product consist of:-

alginic acid and its sodium and calcium salts and its 1,2-propylene glycol ester;
 carboxymethyl cellulose and its sodium salt;

carragenan;

tragacanth;

guar gum;

pectine;

starch and chemically modified starch, e.g. etherized or esterized.

The approximate rough chemical composition of mayonnaise is apparent from the following table:

Protein	1%
Fat	80%
Carbohydrates	2%
Energy value	760 kcal (3170 kJ)

More recently, so-called light mayonnaise has been introduced onto the market where the term "light" is taken to indicate a fat content of about 30-40%.

The rough chemical composition of light mayonnaise is apparent from the following table:

Protein	1.5%
Fat	32%
Carbohydrates	8%
Energy Value	340 kcal (1419 kJ)

The reduction of fat content in light mayonnaise is usually accomplished by reducing the proportion of oil while increasing the proportion of water and thickener.

As is apparent from the above, mayonnaise and light mayonnaise are relatively rare products. As a result of its versatility in the form of industrially manufactured semi-finished products in combination with modern consumption habits, with a demand for quick, convenient product type can easily contribute to a too great intake of fat. The introduction of light mayonnaise would appear to have taken place against the background set forth above.

The consumption of industrially manufactured mayonnaise and light mayonnaise, again

to be the one clearly dominating, since it is rather difficult to produce a good, durable "home-made" product.

According to one aspect of the invention there is provided a low-calorie mayonnaise product essentially consisting of buttermilk, egg yolk, an edible oil, an edible acid, water, sugar, salt, thickener and at least one member selected from spices, mustard and pepper, the product having a fat content of at most 30%.

Preferably, the fat content is between 8 and 12%.

A mayonnaise product according to the invention may have the following composition:

Buttermilk	25-70%, preferably 45-55%
Egg yolk, fresh or a corresponding amount of dry substance from some other form of egg yolk	5-15%, preferably 8-12%
Edible oil, e.g. butter oil, peanut butter oil, soya oil etc.	5-25%, preferably 6-10%
Acetic acid, 10%, vinegar or other edible acids, e.g. lactic acid, citric acid, phosphoric acid and corresponding combinations of these within the pH range of 3.0-5.0 (determined in the final product)	3.5-7.5%, preferably 5.5-6.5%
Water (tap water)	up to 25%, preferably 12-18%
Sugar (saccharose and other carbohydrates with sweetening effect)	3-15%, preferably 4.5-10%
Mustard, powdered	0.2-1.0%, preferably 0.1-0.6%
White pepper, concentrated, and/or allspice, concentrated, or natural spices in an amount giving the corresponding spice strength	up to 1.0%, preferably 0.1-0.4%
Thickener consisting of alginic acid and its sodium and calcium salts and its 1,2-propylene glycol ester, carboxymethyl cellulose and its sodium salt, carragenan, tragacanth, guar gum, pectine, starch and chemically modified starch, e.g. etherized or esterized; powdered fruit seeds	0.5-6.0%, preferably 1-2.5%
Salt (common salt)	up to 3%, preferably 1-2%

A mayonnaise product according to the invention may instead have the following composition:

Buttermilk	15-50%, preferably 25-40%
Egg yolk, fresh or a corresponding amount of dry substance from some other form of egg yolk	4-13%, preferably 7-10%
Edible oil, e.g. butter oil, peanut butter oil, soya oil etc.	up to 25%, preferably 3-7%
Acetic acid, 10%, vinegar or other edible acids, e.g. lactic acid, citric acid, phosphoric acid and corresponding combinations of these within the pH range of 3.0-5.0 (determined in the final product)	2.5-7.0%, preferably 4.5-5.5%
Water (tap water)	20-55%, preferably 30-45%
Sugar (saccharose and other carbohydrates with sweetening effect)	4-20%, preferably 6-12%

Mustard, powdered	0.15-1.0%, preferably 0.3-0.5%
White pepper, concentrated, and/or allspice, concentrated, or natural spices in an amount giving the corresponding spice strength	up to 1.0%, preferably 0.1-0.4%
Thickener consisting of alginic acid and its sodium and calcium salts and its 1,2-propylene glycol ester, carboxymethyl cellulose and its sodium salt, carragenan, tragacanth, guar gum, pectine, starch and chemically modified starch, e.g. etherized or esterized; powdered fruit seeds	0.1-5.0%, preferably 0.3-2%
Salt (common salt)	up to 3%, preferably 1-2%

According to another aspect of the invention there is provided a method of producing from sour buttermilk a low-calorie mayonnaise product, comprising the steps of:-

(a) heat treating the sour buttermilk in a vacuum at a temperature in the range $+40^{\circ}\text{C}$ to $+90^{\circ}\text{C}$ and at a pressure in the range 0.01 to 0.7 bar up to a dry substance content of at most 30%;

(b) thereafter immediately treating the warm product to form a finely divided suspension of protein particles and heat treating the finely divided product at a temperature in the range $+25^{\circ}\text{C}$ to $+90^{\circ}\text{C}$ and at a pressure in the range 50 to 300 bar;

(c) quickly cooling the finely divided product to a temperature of below $+20^{\circ}\text{C}$;

(d) mixing the cooled concentrated sour buttermilk product with water, oil, egg yolk, acetic acid, vinegar and a premixed powder base consisting of sugar, thickener, mustard, salt and spices in a mixing vessel provided with rapidly operating means suitable for mixing in powder products which are difficult to disperse;

(e) thereafter homogenizing the ready-mixed product at a pressure in the range 50-300 bar and at a temperature lower than $+20^{\circ}\text{C}$; and

(f) pasteurizing or sterilizing the homogenized product by heat treatment in suitable equipment to a temperature of at least $+72^{\circ}\text{C}$ during a period of at least 30 seconds.

Preferably, the finely-divided product is quickly cooled to a temperature of below $+8^{\circ}\text{C}$.

Suitably, the treatment of the warm product is homogenization.

Suitably, after the heat treatment, the pasteurized or sterilized homogenized product is poured warm into packing means and then cooled.

Alternatively, after the heat treatment, the pasteurized or sterilized homogenous product is cooled and then poured into a packing means.

The product may be poured aseptically.

The product may be further homogenized before pouring and cooling or cooling and pouring.

Preferably, the treatment of the warm product is such as to provide a suspension with a particulate size not giving rise to sandiness.

In one embodiment, the pasteurization or sterilization of the homogenized product is carried out by heat treatment to a temperature in the range $+90^{\circ}$ to $+95^{\circ}\text{C}$ during a period in the range 2 to 5 minutes, the time and temperature being so adjusted for the sterilized product that remaining microorganisms and enzymes can neither make the product unserviceable for human consumption or otherwise obviously alter it during storage for at least one year at a temperature of up to $+20^{\circ}\text{C}$.

The heat treatment equipment may be selected from a scraping heat exchanger, a pipe heat exchanger, a flat cell heat exchanger and a cooking tureen.

Heat treatment of sour buttermilk in vacuum is preferably carried out at a temperature of $+50^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ and at a pressure of 0.12-0.3 bar, and means that together with the water there is removed a considerable portion of the aromatic substances in the sour buttermilk which are unpleasant to certain people. Examinations using gas chromatography with regard to the alterations taking place in the composition of the buttermilk before and after treatment according to the above show that a number of aromatic substances have been removed. No more precise characterization of these substances has been made, but the absence of unpleasant taste in the product obtained shows that the undesirable flavouring or taste substances have been removed to a great extent.

It is important that the homogenization of the concentrated sour and heat-treated product takes place immediately after heat treatment has terminated and while the product is still warm, otherwise separation of the protein takes place easily.

The subsequent cooling of the homogenized buttermilk must take place quickly, otherwise there is the risk of formation of larger sugar crystals (lacto-crystals), which negatively affects the properties of the product.

When mixing in the powder base products, it is important that these are well dispersed, primarily to avoid the formation of lumps of thickener additives and thereby obtaining operational disturbances in subsequent process steps or disturbances in the form of qualitative ununiformity in the final product.

The homogenization of the ready-mixed product takes place to emulsify the amount of fat present and to finely divide added components so that a smooth and homogenous final product is obtained. Stated temperature limits aim at ensuring that hygienic and product process demands are met.

The heat treatment of the homogenized product takes place to ensure that the hygienic and product process demands placed on the final product are met.

During mixing the pH is adjusted within the pH range of 3.5-4.5, preferably pH 4.0-4.3. Since the nutrient constituents in the buttermilk in the method according to the invention have not been subjected to any notable destruction or conversion, the product produced constitutes an excellent component in different foodstuff compositions, with its content of important nutrients such as adequate protein, easily digested carbohydrates and important vitamins B in combination with low fat content. The manufacturing process of the method according to the invention gives good storage ability and chemical stability to the ready product.

The following example illustrates the composition of a low-calorie mayonnaise-type product produced with the method according to the invention, but is not intended to limit the invention.

25		90	25	
	Buttermilk processed as above	50%		
	Water	12%		
30	Vegetable oil	9%	95	30
	Egg yolk	10%		
35	Subar		100	35
	Acetic acid			
	Vinegar	19%		
40	Spices		105	40
	Salt			
45	Thickener		110	45
		Total	100%	
50	This product has a total fat content of about 11%.	115	50	
	WHAT WE CLAIM IS:-			
	1. A low-calorie mayonnaise product essentially consisting of buttermilk, egg yolk, an edible oil, an edible acid, water, sugar, salt, a thickener and at least one member selected from spices, mustard and pepper, the product having a fat content of at most 30%.			
55	2. A low-calorie mayonnaise product as claimed in Claim 1, wherein the fat content is between 8 and 12%.	120	55	
	3. A low-calorie mayonnaise product as claimed in Claim 1 or Claim 2, wherein the thickener is selected from alginate acid and its sodium and calcium salts, and its 1,2-propylene glycol ester, carboxymethyl cellulose and its sodium salt, carrageenan, tragacanth, guar gum, beetine, starch, chemically modified starch and powdered fruit seeds.	125	60	
60	4. A low-calorie mayonnaise product as claimed in Claim 3, wherein the chemically modified starch is an etherized or esterized starch.			
	5. A low-calorie mayonnaise product as claimed in any preceding Claim, wherein the edible oil is selected from butter oil, peanut butter oil and soy oil.			
65	6. A low-calorie mayonnaise product as claimed in any preceding Claim, wherein the	130		

edible acid is selected from acetic acid, vinegar, lactic acid, citric acid, phosphoric acid and corresponding combinations of these within the pH range of 3.0-5.0 (determined in the final product).

- 5 7. A method of producing from sour buttermilk a low-calorie mayonnaise product, comprising the steps of:- 70
 - (a) heat treating the sour buttermilk in a vacuum at a temperature in the range +40°C to +90°C and at a pressure in the range 0.01 to 0.7 bar up to a dry substance content of at most 30%;
 - 10 (b) thereafter immediately treating the warm product to form a finely divided suspension of protein particles and heat treating the finely divided product at a temperature in the range +25°C to +90°C and at a pressure in the range 50 to 300 bar; 75
 - (c) quickly cooling the finely divided product to a temperature of below +20°C;
 - (d) mixing the cooled concentrated sour buttermilk product with water, oil, egg yolk, acetic acid, vinegar and a premixed powder base consisting of sugar, thickener, mustard, salt and spices in a mixing vessel provided with rapidly operating means suitable for mixing in powder products which are difficult to disperse;
 - 15 (e) thereafter homogenizing the ready-mixed product at a pressure in the range 50 to 300 bar and at a temperature lower than +20°C; and 80
 - (f) pasteurizing or sterilizing the homogenized product by heat treatment in suitable equipment to a temperature of at least +72°C during a period of at least 30 seconds. 85
8. A method as claimed in Claim 7, wherein the finely divided product is quickly cooled to a temperature of below +8°C.
9. A method as claimed in Claim 7 or Claim 8, wherein the treatment of the warm product is homogenization.
- 25 10. A method as claimed in any one of Claims 7 to 9, wherein after the heat treatment, the pasteurized or sterilized homogenized product is poured warm into a packing means and then cooled. 90
11. A method as claimed in any one of Claims 7 to 9, wherein after the heat treatment, the pasteurized or sterilized homogeneous product is cooled and then poured into a packing means. 95
12. A method as claimed in Claim 11, wherein the product is poured aseptically.
13. A method as claimed in Claim 10, wherein the product is further homogenized before pouring and cooling.
14. A method as claimed in Claim 11 or Claim 12, wherein the product is further homogenized before cooling and pouring. 100
15. A method as claimed in any one of Claims 7 to 14, wherein the heat treatment of the sour buttermilk is carried out in vacuum at a temperature of +50°C - +70°C and at a pressure of 0.12 to 0.3 bar.
16. A method as claimed in any one of Claims 7 to 14, wherein the treatment of the warm product is such as to provide a suspension with a particulate size not giving rise to sandiness. 105
17. A method as claimed in any one of Claims 7 to 16, wherein the cooling to the temperature below +20°C is carried out so rapidly that the risk of lacto-crystal formation is avoided and a good bacteriological standard is maintained.
- 45 18. A method as claimed in any one of Claims 7 to 17, wherein the time for mixing is dependent on the rapidly operating means and batch size but wherein the shortest possible mixing time should be aimed at. 110
19. A method as claimed in any one of Claims 7 to 18, wherein the ready-mixed product is homogenized at a pressure in the range 100 to 150 bar and at a temperature in the range +6°C to +10°C to disperse and finely divide the thickener and proteins. 115
20. A method as claimed in any one of Claims 7 to 19, wherein the pasteurization or sterilization of the homogenized product is carried out by heat treatment to a temperature in the range +90°C to +95°C during a period in the range 2 to 5 minutes, the time and temperature being so adjusted for the sterilized product that remaining micro-organisms and enzymes can neither make the product unserviceable for human consumption or otherwise obviously alter it during storage for at least one year at a temperature of up to +20°C.
- 55 21. A method as claimed in any one of Claims 7 to 20, wherein the heat treatment equipment is selected from a scraping heat exchanger, a pipe heat exchanger, a flat cell heat exchanger and a cooking tureen. 120
22. A low-calorie mayonnaise product as claimed in Claim 1 substantially as hereinbefore described. 125
23. A method of producing a low-calorie mayonnaise product as claimed in Claim 7, substantially as hereinbefore described.

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Printed for Her Majesty's Stationery Office, by Croydon Printing Company Limited, Croydon Surrey, 1978.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.